International Journal of Approximate Reasoning 50 (2009) 269

Contents lists available at ScienceDirect

International Journal of Approximate Reasoning

journal homepage: www.elsevier.com/locate/ijar

Editorial

Preface

The special issue on *Bayesian Robustness* stems from discussions with Marco Zaffalon about connections between imprecise probabilities and Bayesian robustness. The issue would like to provide some ideas, grown within the robust Bayesian framework, which could be useful for people working in imprecise probabilities and could generate further ideas which might have an impact on robustness studies.

Imprecise probabilities and Bayesian robustness are sharing many justifications and computational aspects, although they are laid on quite different grounds. Furthermore, their fortunes are quite different; whereas imprecise probabilities have been object of a steady increase in interest over the last decades, Bayesian robustness has known its *Golden Age* in the early 1990s and then researchers moved their interests to other fields, from MCMC methods to the new frontiers which were opened by those powerful simulation methods, e.g. genomics just to mention one. The change of interest among researchers is, somehow, a victory for people who advocated a robust Bayesian approach: nowadays, the need for a sensitivity analysis, to be combined with any Bayesian procedure, is widely recognised.

The issue collects five research papers which are addressing some of the most important, open problems nowadays in Bayesian robustness. A major one is about the development of software useful in performing robustness analysis. A plethora of methods has been proposed to compute robustness measures, e.g. ranges of posterior quantities of interest as the prior distribution varies in a class. The major drawback of these methods is that they often ensure the existence of a solution but they are unable to compute one. Two papers, by O'Neill and Betrò, are addressing the issue of finding efficient algorithms. The former approach is more constructive, based on importance sampling, whereas the latter provides a sound mathematical background to an algorithm, implemented in a software code, which can be used for Bayesian robustness under the generalised moments constrained class, one of the most flexible and powerful ever proposed in literature. Applications to computations of upper and lower probabilities is explicit in the paper by O'Neill, whereas the paper by Betrò could be an interesting tool, still to be explored, in the hands of people working on imprecise probabilities. A more focused paper, again about simulation, is the one by Abraham who is interested in robust Bayesian decision theory. Unlike O'Neill and Betrò, Abraham considers a class of utility functions instead of class of priors and proposes a method for computing the corresponding range of optimal decisions. Although most of the research in Bayesian robustness dealt with classes of priors, uncertainty can be considered also on utilities (or loss functions) and models (or likelihoods). In the same spirit, the work by Arias and coauthors deals with optimal actions under a class of convex loss functions. Here the interest is not on the computational aspects but in the proposal of a new sensitivity measure and its behaviour under different Γ-minimax paradigms. Finally, Martin and coauthors illustrate how Bayesian robustness can be applied in a practical problem. They consider the behaviour of optimal decisions under classes of priors and utilities when analysing two medical decision making problems.

I would like to thank the authors for accepting to write a paper for the special issue, the reviewers for their professional work, Marco Zaffalon for proposing me to prepare the issue and Thierry Denoeux (Editor-in-Chief of IJAR) for accepting the proposal.

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Available online 11 April 2008

doi:10.1016/j.ijar.2008.03.019